

## SECTION III.—FORECASTS.

## FORECASTS AND WARNINGS FOR MAY, 1918.

By H. C. FRANKENFIELD, Supervising Forecaster.

[Dated: Washington, June 4, 1918.]

## GENERAL PRESSURE DISTRIBUTION OVER THE NORTHERN HEMISPHERE, EXCEPT EUROPE AND ASIA.

The observations taken at Midway Island and Honolulu, T. H., indicated a condition of sustained low pressure at the latter and a nearly normal one at the former place after the first decade of May, 1918, when pressure was moderately high except between the 5th and the 7th. Pressure over the Aleutian Islands and Alaska was almost uniformly above the normal, except during the first five days and at the end of the month, with a marked crest over the Aleutians from the 13th to the 21st, inclusive.

Over the United States proper low pressure was the rule after the first few days, except in the Atlantic and Gulf States where it was somewhat above the normal during the second half of the month. The limits of fluctuation were not great.

Over the North Atlantic Ocean pressure was high from May 2 to 30, inclusive, except over the southern portion where it was nearly normal.

## WARNINGS FOR THE WASHINGTON DISTRICT.\*

*Storm warnings.*—On the morning of May 1 there was a disturbance off the southern New England coast, moving northeastward with increasing intensity, and at noon northeast storm warnings were displayed on the eastern Maine coast, with orders to change to northwest at sunset. Only fresh winds occurred, however, and the warning was not justified. (See Chart XLVI-42 for movement of lows.)

On the morning of May 7 a northwestern disturbance was central over Lake Superior with increasing intensity, and at 10 a. m. southwest storm warnings were ordered for Lakes Erie and Ontario, strong southwest and west winds with gales on Lake Erie being indicated during the afternoon and night. Gales occurred as forecast except on Lake Ontario. At 8 p. m. of the 7th the storm was central over Ontario, still moving eastward, and at 10 p. m. southwest storm warnings were ordered on the Atlantic coast from Delaware Breakwater, Del., to Boston. Strong southwest to west winds were expected to blow during the early morning of the 8th, shifting to northwest during the day. This warning was but partially verified, as there were no strong winds except on the southern New England coast.

On the morning of May 9 a marked disturbance from the middle Plateau Region was central over western Nebraska, accompanied by rapidly falling pressure to the east, and at 11 a. m. northeast storm warnings were ordered for Lake Superior and the northern portions of Lakes Michigan and Huron. At the same time southwest warnings were ordered for the southern portions

of Lakes Michigan and Huron and at Detroit and Toledo. At 3 p. m. southwest warnings were extended on the lower Lakes from Sandusky to Buffalo. These warnings were fully verified except on western Lake Superior, the maximum wind velocities ranging from 32 to 60 miles an hour. On the morning of May 10 northwest storm warnings were ordered on Lake Ontario, and the warnings on eastern Lake Superior, northern Michigan, Huron, and Erie were changed to northwest with instructions to lower at sunset on Michigan and Superior. By this time the storm was central over Ontario, retaining its marked form, and at 11 a. m. southwest storm warnings were ordered on the Atlantic coast from Norfolk, Va., to Eastport, Me., in anticipation of strong southwest winds that would shift to west and northwest by the following morning, probably reaching gale force. These warnings were also verified, although the winds did not quite reach gale force along the Atlantic coast.

On the evening of May 14 pressure was falling rapidly over the West, and at the same time was quite high over the northern upper Lake Region; accordingly northeast storm warnings were ordered at 10 p. m. on Lake Superior for strong easterly winds on the following day. This warning was partially verified, strong winds occurring over the central and eastern portions of Lake Superior.

On May 16 there was another marked depression over the Northwest with a quite strong gradient southeastward, and after the receipt of special observations southwest storm warnings were ordered at 5 p. m. for Lakes Superior, Michigan, and northern Huron. Strong south to southwest winds were indicated, with a shift to northwest on the following day over western Lake Superior. This disturbance did not develop as had been expected, there were no strong winds except over central Lake Superior, and warnings were lowered at 10 a. m. of the 17th.

On May 21 another Plateau disturbance was central over western Nebraska with strong high pressure to the northeast, and at 10 a. m. northeast storm warnings were ordered on Lake Superior from Duluth to Eagle Harbor, Mich. This warning was verified by the occurrence of a wind of 42 miles an hour from the northeast at Duluth.

There were several small-craft warnings ordered during the month for local fresh winds. None was of consequence.

*Frost warnings.*—The North Atlantic coast disturbance on the morning of May 1 was followed by an extensive cold, high-pressure area (see Chart XLVI-41) accompanied by heavy to killing frosts in the upper Mississippi Valley and the upper Lake Region. Frosts were forecast for the following morning for the Ohio Valley, central and eastern Tennessee, the lower Lake Region, and the Atlantic States from New England to the interior of South Carolina and Georgia, with heavy frosts expected north of Maryland and Delaware. These frosts occurred as forecast, except in Georgia and central South Carolina. As pressure was still very high on the morning of the 2d in the Ohio Valley and the lower Lake Region, frosts were again forecast for the mountains of Maryland and West Virginia, interior of Virginia and North Carolina and for the cranberry district of New Jersey.

\* Time used in this discussion is "summer time" throughout.

These warnings were not well verified, although frost occurred on the 3d in extreme western North Carolina and temperatures below freezing in the cranberry bogs.

On the morning of May 8, following a well-defined disturbance over New England, frosts were forecast for northern New England, the western portion of eastern New York, and interior of western New York; but owing to rapidly falling pressure in the West during the following night there was but little fall in temperature and no frosts were reported except from the western portion of western New York.

On the morning of May 10, with a severe disturbance over Ontario and rapidly rising pressure to the westward, frosts were forecast for the upper Lake and western lower Lake Region. Frosts occurred on the following morning over the greater portion of the area for which they had been forecast, except Ohio. On the morning of May 11, frost warnings were extended eastward to southern New England, interior eastern New York, and the cranberry bogs of New Jersey, if the weather cleared. This it did not do, as the rapid approach of a disturbance from the southwest created a general condition of cloudiness by the following morning, by which time low pressure prevailed over the Central Valleys and the Lake Region, followed by a rapid local rise in the Northwest which appeared to indicate frosts or freezing temperature for the following morning in upper Michigan. Warnings to that effect were accordingly issued and were verified by the occurrence of heavy frost and of freezing temperatures on the morning of the 13th. At this time, although conditions were much unsettled over the central valleys, temperatures were quite low with rising pressure, and frost warnings were therefore issued for Michigan, northern and central Indiana, western Pennsylvania, and Ohio. These warnings were not verified except in lower Michigan, although temperatures close to freezing occurred in upper Michigan.

Local frost warnings for limited localities were also issued on the 15th, 20th, 21st, 22d, and 23d. A majority were verified, although none was of consequence.

#### WARNINGS FOR OTHER DISTRICTS.\*

*Chicago, Ill., forecast district.*—The most important warnings issued during May were the sheep warnings for Montana and Wyoming on the 8th, and for Wyoming on the 25th. They were fully verified, as snow and freezing temperatures ensued within 24 to 30 hours. A similar warning for Montana on the 14th was not verified.

Warnings of frost or freezing temperature were issued on the 9th for the Northwestern States and frost for the western portions of Nebraska and Kansas. These warnings were mostly verified. Frost warnings were also issued for the upper Mississippi Valley on the 12th and north and central Wisconsin on the 22d. These were verified. No warnings of importance were issued during the remainder of the month.—*Charles L. Mitchell, Forecaster.*

*New Orleans forecast district.*—The prevailing high barometric pressure over the Eastern and Southeastern States and the depressions that were over the central districts for the most of May, 1918, resulted, as a rule, in mild summerlike weather. No severe storms occurred and conditions requiring warnings were confined to the first 11 days.

A southeast storm warning was issued for the Texas coast east of Matagorda Bay, on indications of the 8 p. m. map of the 5th. A secondary depression was central over the Texas Panhandle and a moderately steep barometric gradient extended over Texas. The warning, which was justified by the occurrence of a moderate gale, was lowered the next morning, as conditions rendered it no longer necessary.

A small-craft warning was issued for the Texas coast on the 11th and was justified.

Light frost in northeastern Arkansas was forecast on the 1st and occurred as predicted. The frost warning of the 10th, issued for northeastern Oklahoma and northern Arkansas, failed of verification owing to the strong development of a depression from the Southwest.—*R. A. Dyke, Forecaster.*

*Denver, Colo., forecast district.*—The month was marked by a persistency of low pressure throughout the district with ill-defined and shifting low centers. Two slight interruptions to this distribution of pressure occurred in the extreme northern part of the district, bringing moderate precipitation, but elsewhere droughty conditions prevailed. Warnings of freezing temperatures and heavy frosts were issued on May 10, 11, and 12 for parts of Colorado, and for light local frosts on a number of dates in different parts of the district until the end of the month.

From the 6th to the 8th an extensive low-pressure area occupied the interior of the country west of the Mississippi. During the 8th the depression assumed a definite form with its center over Colorado, while a high-pressure area was in course of development in Alberta. On the morning of the 9th the depression, which had deepened, was central in western Nebraska. This storm moved north-eastward during the next 12 hours, while the front of the high-pressure area spread southward along the eastern Rocky Mountain slope, attended by snow in north-central Colorado and freezing temperature in the northeastern quarter of the State. Fortunately, vegetation in that part of Colorado was too backward to be injured by the low temperatures. During the 9th a depression formed in the eastern parts of Utah and Arizona, and under its influence the pressure along the southern front of the high-pressure area that overlay the eastern slope on the 10th fell rapidly, permitting the southeastward movement of the depression to New Mexico and Texas. With the change in the position of the low center, skies cleared in the North Fork and Uncompahgre districts in western Colorado. Special warnings were sent direct to the growers at 8 p. m. of May 11, and practically all equipped for orchard heating utilized the information. The next morning, the 12th, temperatures were still below freezing in the North Fork and Uncompahgre districts, but in the Grand Valley, which had escaped freezing weather the preceding night, temperatures fell decidedly, the readings in the orchard districts ranging from 24° to 34°.—*Frederick H. Brandenburg, Forecaster.*

*San Francisco, Cal., forecast district.*—May, 1918, was a quiet month on the Pacific slope. All storms passing inland from the Pacific during the month entered the continent at a very high latitude and passed through the British possessions. Secondary depressions formed in the southwestern quadrant of several of these storms, either in British Columbia and moved south over the Plateau Region to the valley of the Colorado, or formed over the latter section, and thence moved eastward. These caused the only precipitation occurring in the district.

\* Time used is "summer time" for respective time zones.

No storm warnings were ordered, but small-craft warnings were issued on the morning of the 2d for the mouth of the Columbia River, Strait Juan de Fuca, and Gulf of Georgia, and were justified.

Live-stock warnings were issued on the morning of the 15th, in eastern Oregon, Idaho, and Nevada. The warning read:

To-night and Wednesday showers; colder for the next few days with strong gusty westerly winds. Notify stockmen.

This warning proved timely, as there was a marked fall in temperature in the specified districts during the ensuing 24 hours. As sheep shearing was at its height at this time, it is believed the warning was of great benefit to the stockmen.

The month was cool and there were a number of mornings when heavy to killing frosts occurred in the

Plateau Region causing damage to fruit and garden truck. Frost also occurred in limited areas in the northern coast counties of California, causing some damage to vineyards. Warnings of frost were issued in Nevada, Idaho, and Washington and Oregon, except near the coast, on the 5th, 6th, 9th, 10th, 21st, and 23d, and were generally verified.

Light rains occurred in the first and second decades in Washington and western Oregon, and showers in the second and third decades in Idaho and Nevada. Scattered light showers occurred in California on the 8th, 9th, and 27th. The rainfall was deficient over the entire district and crops are suffering from a lack of moisture.—*G. H. Willson, forecaster.*